

# Combustion Model for Industrial Numerical Simulations.

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An original model for numerical simulation of turbulent premixed and partially premixed combustion at large  $Re$  and  $Da$  numbers is described. A quantitative description of the coupling between turbulence and chemistry by the flamelet mechanism is proposed, based on the generalized Kolmogorov concept of small-scale equilibrium structures in developed turbulence.

A model equations for premixed combustion is described in the terms of a reaction progress variable. This model has been implemented in the commercial code FLUENT5, and is validated against the experiments by V. Karpov (spherical flames in a well-stirred reactor) and P. Moreau (high velocity combustion in a channel).

Partially premixed combustion is modeled by transport equations for the PDF of passive concentration and the conditional progress variable. Results of numerical simulations with turbulence-chemistry coupling by equilibrium and laminar-flamelet chemistry are compared with experimental data by Barlow and Frank.